

IAP6 Rec'd PCT 09 FEB 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

US020557

Serial No. 10/538,632

International Application No. PCT/IB03/05938

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE

Commissioner for Patents, Alexandria, VA 22313

ATTENTION: APPLICATION DIVISION

RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS
UNDER 35 U.S.C. 371

Sir:

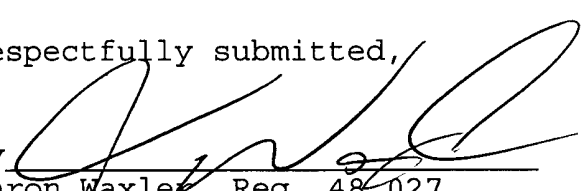
In response to the NOTIFICATION OF MISSING REQUIREMENTS
mailed on December 8, 2005, enclosed is a Petition to file
Application on behalf of Co-Inventor who is Unavailable under 37
C.F.R. §1.47 and a Declaration of Facts Regarding Inventor's
Unavailability. Accordingly, the above-identified patent
application is now complete.

Please charge Deposit Account No. 14-1270 any fees which
may be required and credit any overpayment.

Respectfully submitted,

02/15/2006 HKAYPAGH 00000059 141270 10538632


01 FC:1617 130.00 DA

By 
Aaron Waxler, Reg. 48,027
Attorney
(914) 333-9608

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited this date
with the United States Postal Service as first-class mail in an envelope addressed to:
COMMISSIONER OF PATENTS AND TRADEMARKS
Alexandria, VA 22313-1450

On

Feb. 7 2006
By 

RECEIVED

10 APR 2006

Legal Staff
International Division



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| | | |
|---|--------------------------------------|--------------------------------|
| U.S. APPLICATION NUMBER NO. 10/538,632 | FIRST NAMED APPLICANT Saleh Osman | ATTY. DOCKET NO. PHUS020557 |
|---|--------------------------------------|--------------------------------|

| |
|---|
| INTERNATIONAL APPLICATION NO. PCT/IB03/05938 |
|---|

| | |
|--------------------------------|-----------------------------|
| I.A. FILING DATE 12/10/2003 | PRIORITY DATE 12/12/2002 |
|--------------------------------|-----------------------------|

24737
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

CONFIRMATION NO. 5395
371 FORMALITIES LETTER



OC000000017601717

Date Mailed: 12/08/2005

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Copy of the International Application filed on 06/10/2005
- Copy of the International Search Report filed on 06/10/2005
- Preliminary Amendments filed on 06/10/2005
- Information Disclosure Statements filed on 06/10/2005
- Oath or Declaration filed on 06/10/2005
- U.S. Basic National Fees filed on 06/10/2005
- Priority Documents filed on 06/10/2005

| DOCKETED | DATE | INITIAL |
|-----------|------|-------------|
| COMPUTER | PC | DEC 12 2005 |
| SECRETARY | | |
| ATTORNEY | | |

05 DEC 12 11:06:13

The applicant needs to satisfy supplemental fees problems indicated below.

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date. The current oath or declaration does not comply with 37 CFR 1.497(a) and (b) in that it:
 - is not executed in accordance with either 37 CFR 1.66 or 37 CFR 1.68.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.492(h) of \$130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fees required for this application is \$130 for a Large Entity:

- \$130 Surcharge.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE OR BY 32 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

JOHN L ANDERSON

Telephone: (703) 308-9140 EXT 211

PART 1 - ATTORNEY/APPLICANT COPY

| U.S. APPLICATION NUMBER NO. | INTERNATIONAL APPLICATION NO. | ATTY. DOCKET NO. |
|-----------------------------|-------------------------------|------------------|
| 10/538,632 | PCT/IB03/05938 | PHUS020557 |

FORM PCT/DO/EO/905 (371 Formalities Notice)

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☒ Declaration
Submitted
With Initial
Filing

OR

☐ Declaration
Submitted after Initial
Filing (surcharge
(37 CFR 1.16 (e))
required)

Attorney Docket Number PHUS020557

First Named Inventor SALEH OSMAN

COMPLETE IF KNOWN

Application Number

/

Filing Date

Group Art Unit

Examiner Name

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE**

the specification of which

(Title of the Invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT international application having a filing date before that of the application on which priority is claimed.

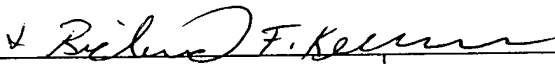
| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) Country | Priority Not Claimed | Certified Copy Attached? | |
|--|---------|---|--------------------------|--------------------------|--------------------------|
| | | | | YES | NO |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

DECLARATION — Utility or Design Patent Application

| | | | | | |
|---|--|---|--|---|--|
| Direct all correspondence to: <input checked="" type="checkbox"/> Customer Number or Bar Code Label | | *24737* | | OR <input checked="" type="checkbox"/> Correspondence address below | |
| Philips Electronics North America Corporation | | | | | |
| Name | | | | | |
| P.O. BOX 3001 | | | | | |
| Address | | | | | |
| BRIARCLIFF MANOR | | NY | | 10510 | |
| City | | State | | ZIP | |
| U.S.A. | | (914) 945-6000 | | (914) 332-0615 | |
| Country | | Telephone | | Fax | |
| I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. | | | | | |
| NAME OF SOLE OR FIRST INVENTOR: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) | | SALEH | | Family Name or Surname | |
| | | | | OSMAN | |
| Inventor's Signature | | | | Date | |
| NORWOOD | | MA | | USA | |
| Residence: City | | State | | Country | |
| | | | | GREAT BRITAIN | |
| | | | | Citizenship | |
| 2906 VILLAGE ROAD WEST | | | | | |
| Mailing Address | | | | | |
| NORWOOD | | MA | | 02062 | |
| City | | State | | Zip | |
| | | | | USA | |
| | | | | Country | |
| NAME OF SECOND INVENTOR: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) | | RICHARD F. | | Family Name or Surname | |
| | | | | KEENAN | |
| Inventor's Signature | | | | Date | |
|  | | | | 3/5/04 | |
| MEDWAY Whitinsville R.K. | | MA | | USA | |
| Residence: City | | State | | Country | |
| | | | | USA | |
| | | | | Citizenship | |
| 280 VILLAGE STREET UNIT G4 103 Carole Ln. R.K. | | | | | |
| Mailing Address | | | | | |
| MEDWAY Whitinsville R.K. | | MA | | 02053 R.K. | |
| City | | State | | Zip | |
| | | | | 01588 | |
| | | | | USA | |
| | | | | Country | |
| <input type="checkbox"/> Additional Inventors are being named on the 1 ST PAGE supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto. | | | | | |

Please type a plus sign (+) inside this box -

Appr. on 10/31/2002. OMB 0851-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION**ADDITIONAL INVENTOR(S)
Supplemental Sheet
Page 1 of 1**

| | | | |
|--|------------|---|-------|
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| JAROSLAW | | LUCEK | |
| Inventor's Signature | | Date | |
| Residence: City | CUMBERLAND | State | RI |
| | | Country | USA |
| Mailing Address | | 40 GREEN MEADOW LANE | |
| Mailing Address | | | |
| City | CUMBERLAND | State | RI |
| | | ZIP | 02864 |
| | | Country | USA |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | | State | |
| | | Country | |
| Mailing Address | | | |
| Mailing Address | | | |
| City | | State | |
| | | Zip | |
| | | Country | |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | | State | |
| | | Country | |
| Mailing Address | | | |
| Mailing Address | | | |
| City | | State | |
| | | Zip | |
| | | Country | |

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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**DECLARATION FOR UTILITY OR
DESIGN
PATENT APPLICATION
(37 CFR 1.63)**

☒ Declaration Submitted With Initial Filing OR ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

| | |
|--------------------------|-------------|
| Attorney Docket Number | PHUS020557 |
| First Named Inventor | SALEH OSMAN |
| COMPLETE IF KNOWN | |
| Application Number | / |
| Filing Date | |
| Group Art Unit | |
| Examiner Name | |

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE**

the specification of which (Title of the Invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT international application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) Country | Priority Not Claimed | Certified Copy Attached? | |
|-------------------------------------|---------|--|--------------------------|--------------------------|--------------------------|
| | | | | YES | NO |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO:** Assistant Commissioner for Patents, Washington, DC 20231.

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DECLARATION — Utility or Design Patent Application

| | | | | | | | |
|---|--|---------|--|---|--|--|--|
| Direct all correspondence to: <input checked="" type="checkbox"/> Customer Number or Bar Code Label | | *24737* | | OR | | <input checked="" type="checkbox"/> Correspondence address below | |
| Philips Electronics North America Corporation | | | | | | | |
| Name | | | | | | | |
| P.O. BOX 3001 | | | | | | | |
| Address | | | | | | | |
| BRIARCLIFF MANOR | | | | NY | | 10510 | |
| City | | | | State | | ZIP | |
| U.S.A. | | | | (914) 945-6000 | | (914) 332-0615 | |
| Country | | | | Telephone | | Fax | |
| I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. | | | | | | | |
| NAME OF SOLE OR FIRST INVENTOR: | | | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) SALEH | | | | Family Name or Surname OSMAN | | | |
| Inventor's Signature | | | | | | Date | |
| NORWOOD | | | | MA | | USA | |
| Residence: City | | | | State | | Country | |
| 2906 VILLAGE ROAD WEST | | | | GREAT BRITAIN | | | |
| Mailing Address | | | | Citizenship | | | |
| NORWOOD | | | | MA | | 02062 | |
| City | | | | State | | Zip | |
| USA | | | | Country | | | |
| NAME OF SECOND INVENTOR: | | | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) RICHARD F. | | | | Family Name or Surname KEENAN | | | |
| Inventor's Signature | | | | | | Date | |
| MEDWAY | | | | MA | | USA | |
| Residence: City | | | | State | | Country | |
| 280 VILLAGE STREET UNIT G1 | | | | USA | | | |
| Mailing Address | | | | Citizenship | | | |
| MEDWAY | | | | MA | | 02053 | |
| City | | | | State | | Zip | |
| USA | | | | Country | | | |
| <input type="checkbox"/> Additional Inventors are being named on the <u>1ST</u> PAGE supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto. | | | | | | | |

Please type a plus sign (+) inside this box →



Approved for use through 10/31/2002. OMB 0651-0032
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION
ADDITIONAL INVENTOR(S)
Supplemental Sheet
 Page 1 of 1

| | | | |
|--|--------------|---|-------------|
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| JAROSLAW | | LUCEK | |
| Inventor's Signature <i>Jaroslav Lucek</i> | | Date <i>12-09-03</i> | |
| Residence: City | State | Country | Citizenship |
| <i>CUMBERLAND GREENSBORO</i> | <i>RI NC</i> | USA | USA |
| Mailing Address <i>40 GREEN MEADOW LANE 307 TOWER LN</i> | | | |
| Mailing Address | | | |
| City | State | ZIP | Country |
| <i>CUMBERLAND GREENSBORO</i> | <i>RI NC</i> | <i>02864 27410</i> | USA |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | State | Country | Citizenship |
| | | | |
| Mailing Address | | | |
| Mailing Address | | | |
| City | State | Zip | Country |
| | | | |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | State | Country | Citizenship |
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| Mailing Address | | | |
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| City | State | Zip | Country |
| | | | |

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

PHUS020557

Serial No. 10/538,632

Filed: June 10, 2005

Title: PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER
BY DYNAMICALLY ADJUSTING GAIN AND PHASE

Commissioner for Patents
Alexandria, VA 22313-1450

**PETITION TO FILE APPLICATION ON BEHALF OF CO-INVENTOR
WHO IS UNAVAILABLE UNDER 37 C.F.R. §1.47**

Sir:

Koninklijke Philips Electronics, N.V., the owner (by assignment and operation of law) of the invention embodied in the above-referenced patent application, hereby petitions to file the accompanying application on behalf of Saleh Osman. Mr. Osman is a co-inventor of the present application. Mr. Osman conceived the subject matter of this invention while employed by Koninklijke Philips Electronics, N.V.

As more fully set forth in the accompanying "Declaration of Facts Regarding Inventor's Unavailability," several unsuccessful attempts have been made to locate and contact Mr. Osman (e.g., certified mailings, multiple telephone calls on multiple occasions, attempts to email, *etc.*). Therefore, Koninklijke Philips Electronics, N.V., on behalf of Mr. Osman hereby petitions the Patent Office, pursuant to 37 C.F.R. § 1.47, to allow Koninklijke Philips Electronics, N.V. to file this application on Mr. Osman's behalf.

As per 37 CFR 1.47(a) and 35 U.S.C. 116, second paragraph, all available joint inventors are required to file an application "on behalf of" themselves and on behalf of a joint inventor who "cannot be found or reached after diligent effort" or who refuses to "join in an application."

Additionally, according to 35 U.S.C. 111(a) and 115, an application deposited in the U.S. Patent and Trademark Office pursuant to 37 CFR 1.47(a) must meet the following requirements:

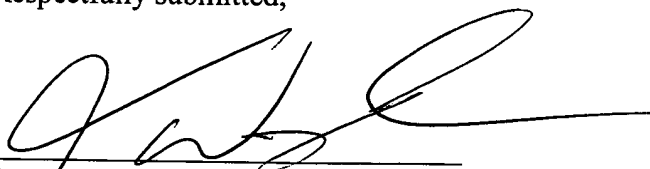
A) All the available joint inventors must (1) make oath or declaration on their own behalf as required by 37 CFR 1.63 or 1.175 (see MPEP § 602, § 605.01, and § 1414) and (2) make oath or declaration on behalf of the nonsigning joint inventor as required by 37 CFR 1.64. An oath or declaration signed by all the available joint inventors with the signature block of the nonsigning inventor(s) left blank may be treated as having been signed by all the available joint inventors on behalf of the nonsigning inventor(s), unless otherwise indicated.

(B) The application must be accompanied by proof that the nonsigning inventor (1) cannot be found or reached after diligent effort or (2) refuses to execute the application papers. See MPEP § 409.03(d).

(C) The last known address of the nonsigning joint inventor must be stated. See MPEP § 409.03(e).

With respect to 37 CFR 1.47(a)(A), enclosed please find an executed declaration by Richard F. Keenan and Jaroslaw Lucek—the available joint inventors. With respect to 37 CFR 1.47(a)(B), the enclosed declaration of facts regarding inventor's unavailability provides proof the nonsigning inventor cannot be found or reached after diligent effort. Finally, with respect to 37 CFR 1.47(a)(C), Mr. Osman's last known address is 2906 Village Road West, Norwood, MA 02062.

Respectfully submitted,



Aaron Waxler, Reg.No. 48, 027
Attorney

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

PHUS020557

Serial No.

Filed: CONCURRENTLY

Title: PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER
AMPLIFIER BY DYNAMICALLY ADJUSTING GAIN AND PHASE

Commissioner for Patents
Alexandria, VA 22313-1450

DECLARATION OF FACTS REGARDING INVENTOR'S UNAVAILABILITY

I Dicran Halajian hereby declare that:

I prepared the above-referenced patent application.

A copy of the patent application, drawings, declaration, and assignment were emailed to the co-inventors for review and comment. However, Mr. Saleh Osman is no longer employed by Koninklijke Philips Electronics, N.V., and all attempts to contact Mr. Osman have failed.

Multiple attempts were made to call Mr. Osman at the last known phone number. Multiple messages were left on an answering machine. No return call was received from Mr. Osman.

On December 12, 2002, October 24, 2003 and March 5, 2004, the application packet, including declaration and assignment, were sent to Mr. Osman's last known address via Federal Express. Mr. Osman has not returned the documents to Koninklijke Philips Electronics, N.V.

Mr. Osman's last known address is 2906 Village Road West, Norwood, MA 02062.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

6/9/05

Date

Dm Hg

Dicran Halajian, Reg. No. 39,703

PHILIPS

Richard Keenan
10/17/2006 07:11 AM

To Korne Vennema/SVL/SC/PHILIPS@PHILIPS

cc Jarek Lucek/SVL/SC/PHILIPS@PHILIPS
Peter Zawilski/SVL/IPS/PHILIPS@PHILIPS

bcc

Subject Re: US020555 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...and
US020557 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER..."

Classification Unclassified

Peter,

I also do not have his contact information.

Rich

Richard Keenan
RFID Applications Engineer - Identification
BU A&I - Sales & Marketing
NXP Semiconductors
2178 Mendon Rd., Suite 300
Cumberland, RI 02864 USA

Tel: +1 401 305 5059
Mob: +1 508 509 1000
Fax: +1 401 305 5060
email: richard.keenan@nxp.com

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Korne Vennema

PHILIPS

Korne Vennema
10/17/06 09:20 AM

To Jarek Lucek/SVL/SC/PHILIPS@PHILIPS

cc Peter Zawilski/SVL/IPS/PHILIPS@PHILIPS
Richard Keenan/SVL/SC/PHILIPS@PHILIPS

Subject Re: US020555 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...and
US020557 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER..."

Classification Unclassified

Peter,

Unfortunately I do not have his contact information either.

Korné Vennema
Sr. Marketing Application Engineer
NXP Semiconductors

2178 Mendon Road, Suite 300
Cumberland, RI 02864
USA

Office Phone: (401) 305-5051, Mobile: (401) 578-0463
Lab Phone: (401) 305-5058 (no voice mail)
Mobile Holland: +31-6-13660653
e-mail: korne.vennema@nxp.com

Jarek Lucek

Jarek Lucek
10/16/06 08:47 PM

To Peter Zawilski/SVL/IPS/PHILIPS@PHILIPS
cc Korne Vennema/SVL/SC/PHILIPS@PHILIPS
Richard Keenan/SVL/SC/PHILIPS@PHILIPS
Subject Re: US020555 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...and
US020557 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...
Classification Unclassified

Hi, Peter,

I don't have contact info for Saleh. Shortly after filing the patents we have let him go.

Korne Vennema or Rich Keenan might have his contact info. I've copied them both on this email.

Regards,

Jarek Lucek
NXP Semiconductors - founded by Philips
508-446-6739 cell
<http://www.semiconductors.com/products/rf/index.html>

All transactions for the purchase of NXP Semiconductors' products are subject to NXP Semiconductors' general terms and conditions of commercial sale. These are published at:
<http://www.nxp.com/profile/terms/index.html>
Peter Zawilski

To Jarek Lucek/SVL/SC/PHILIPS@PHILIPS
cc
Subject US020555 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...and
US020557 Patent Application titled, "PRESERVING
LINEARITY OF AN ISOLATOR-FREE POWER...
Classification Unclassified

Peter Zawilski
10/16/06 03:14 PM

Dear Jarek::

I telephoned you earlier in the day and left a message on your voicemail .

I am the Patent Agent managing the above cases, you originally had worked with attorneys in Philips , Briarcliff Manor, New York offices (under Philips IP&S). These cases had been filed in the US Patent Office in December 2003.

I am trying to locate co-inventor Saleh Osman. Apparently, during the filing of the US application he did not sign the Oath & Declaration. Without his signature, the cases will not move forward. You and other co-inventor Richard Keenan had signed.

As of this morning, I have not been able to locate Mr. Osman. Would you happen to have a current E-mail address and telephone number of Mr. Osman?

I appreciate your help.

Hope to hear from you in a day or so.

Kindest regards,

Peter Z

Peter S. Zawilski
Patent Agent

NXP Semiconductors
Intellectual Property Department
Visitor's address: 1130 Ringwood Court; Mail Stop SJ41, San Jose, CA 95131 USA
Courier address: 1140 Ringwood Court; Mail Stop SJ41
San Jose, CA 95131 USA
Mail address: 1109 McKay Drive; Mail Stop SJ41, San Jose, CA 95131 USA
Phone: +1 408 474 9063 Facsimile: +1 408 474-9082
Main Phone: (408) 434-3000
Email: peter.zawilski@philips.com
Intranet: pww.ips.philips.com
Internet: www.nxp.com

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Peter Zawilski
Patent Agent

October 19, 2006

Mr. Saleh Osman
2906 Village Road West
Norwood, MA 02062

Intellectual Property Department
NXP Semiconductors
Tel: +1 408 474 9063, Fax: +1 408 474 9082
1109 McKay Drive, M/S-41, San Jose, CA 95131 USA
peter.zawilski@nxp.com, www.nxp.com

VIA EXPRESS MAIL

Subject: Philips Filing No.: US 020557; US Application Serial No. 10/538,632 filed 10-JUN-2005
Titled: Preserving Linearity of an Isolator-Free Power Amplifier by Dynamically Adjusting
Gain and Phases

Dear Saleh:

The above-name patent application was filed in the United Patent Office. Your colleagues Richard Keenan and Jaroslaw Lucek had signed the required papers for completing the filing. However, your signature is necessary for the case to move forward.

I have enclosed a copy of the as filed application for your review. Please sign, date, and return the Oath & Declaration to me at your earliest convenience. A prepaid return envelope has been enclosed. Also, please fax back a copy of both pages to me at (408) 474-9082.

NXP formerly Philips Semiconductors, appreciates your support in protecting its valuable IP assets.

If you have any questions, please feel free to get in touch with me.

Very truly yours,

Peter Zawilski
Patent Agent
(408) 474-9063

| | | |
|--|--------------------------|--------------|
| DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input type="checkbox"/> Declaration Submitted with Initial Filing <input checked="" type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16(e)) required) OR | Attorney Docket Number | US 020557 |
| | First Named Inventor | Osman, Saleh |
| | COMPLETE IF KNOWN | |
| | Application Number | 10/538,632 |
| | Filing Date | 06/10/2005 |
| | Group Art Unit | |
| Examiner Name | | |

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**Preserving Linearity of an Isolator-Free Power Amplifier by
Dynamically Adjusting Gain and Phase**

(Title of the Invention)

the specification of which:

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) **06/10/2005** as United States Application Number or PCT International Application Number **10/538,632** and was amended on (MM/DD/YYYY) **06/10/2005** (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT international application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Numbers(s) | Country | Foreign Filing Date (MM/DD/YYYY) | Priority Not Claimed | Certified Copy Attached? | |
|--------------------------------------|---------|----------------------------------|--------------------------|--------------------------|--------------------------|
| Yes | No | | | | |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

☐ Additional foreign application numbers are listed on a supplemental priority data sheet attached hereto:

DECLARATION ---- Utility or Design Patent Application

| | | | |
|---|----------------------------|--|---|
| Direct all correspondence to: <input checked="" type="checkbox"/> Customer Number 24738 AND/OR <input type="checkbox"/> Correspondence address below | | | |
| PHILIPS ELECTRONICS NORTH AMERICA CORPORATION Intellectual Property & Standards <small>Name</small> | | | |
| Address 1109 McKay Drive, M/S-41SJ | | | |
| City | San Jose | State | California |
| Country | U.S.A | Telephone | (408) 474-9073 |
| | | FAX | (408) 474-9082 |
| I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. | | | |
| NAME OF SOLE OR FIRST INVENTOR: <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name SALEH <small>(first & middle (if any))</small> | | Family Name OSMAN <small>or Surname</small> | |
| Inventor's Signature | | | Date |
| Norwood <small>Residence: City</small> | MA <small>State</small> | U.S.A. <small>Country</small> | Great Britain <small>Citizenship</small> |
| 2906 Village Road West <small>Mailing Address</small> | | | |
| Norwood <small>City</small> | MA <small>State</small> | 02062 <small>ZIP</small> | U.S.A. <small>Country</small> |
| NAME OF SECOND INVENTOR: <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name RICHARD F. <small>(first & middle (if any))</small> | | Family Name KEENAN <small>or Surname</small> | |
| Inventor's Signature | | | Date |
| Whitinsville <small>Residence: City</small> | MA <small>State</small> | U.S.A. <small>Country</small> | U.S.A. <small>Citizenship</small> |
| 103 Carole Lane <small>Mailing Address</small> | | | |
| Whitinsville <small>City</small> | MA <small>State</small> | 01588 <small>ZIP</small> | U.S.A. <small>Country</small> |
| NAME OF THIRD INVENTOR: <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name JAROSLAW <small>(first & middle (if any))</small> | | Family Name LUCEK <small>or Surname</small> | |
| Inventor's Signature | | | Date |
| Greensboro <small>Residence: City</small> | NC <small>State</small> | U.S.A. <small>Country</small> | U.S.A. <small>Citizenship</small> |
| 307 Tower Lane <small>Mailing Address</small> | | | |
| Greensboro <small>City</small> | NC <small>State</small> | 27410 <small>ZIP</small> | U.S.A. <small>Country</small> |
| <input type="checkbox"/> Additional inventors are being named on the _____ supplemental Additional Inventor(s) sheet(s) attached hereto. | | | |

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| Time In | | Military | <input type="checkbox"/> 3 PM | Delivery Date | | Time | |
| Mo. | Day | Year | <input type="checkbox"/> 2nd Day | Mo. | Day | <input type="checkbox"/> AM | <input type="checkbox"/> PM |
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Exhibit 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

US020557

Serial No.

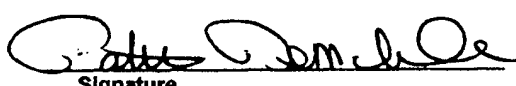
Group Art Unit

Filed: CONCURRENTLY

Ex.

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE

Commissioner for Patents
Alexandria, VA 22313-1450

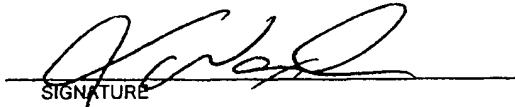
| CERTIFICATE OF EXPRESS MAILING | |
|---|---|
| Express Mail Label No. | EV 664 854 860 US |
| Date of Deposit | June 10, 2005 |
| I hereby certify that this paper and/or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner for Patents, PO Box, 1450, Alexandria, VA 22313-1450 | |
| Patti DeMichele Typed Name |  Signature |

JUN 10 2005

| | | |
|---|---|--|
| TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371 | | ATTORNEY'S ENTRY NUMBER PHUS020557 |
| INTERNATIONAL APPLICATION NO. PCT/IB2003/005938 | INTERNATIONAL FILING DATE 10 December 2003 | U.S. APPLICATION NO. (If known, see 37 CFR 1.5) PRIORITY DATE CLAIMED 12 December 2002 |
| TITLE OF INVENTION PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY DYNAMICALLY ADJUSTING GAIN | | |
| APPLICANT(S) FOR DO/EO/US SALEH OSMAN, RICHARD F. KEENAN and JAROSLAW LUCEK | | |
| Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information: | | |
| <p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a submission under 35 U.S.C. 371.</p> <p>2. <input checked="" type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a submission under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input type="checkbox"/> The US has been elected (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> Is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> Is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input type="checkbox"/> Is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A preliminary amendment.</p> <p>14. <input type="checkbox"/> An Application Data Sheet under 37 CFR 1.76.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A power of attorney and/or change of address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 37 CFR 1.821-1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published International Application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: Express Mail Certificate; PCT Confirmation Postcard; PTO/SB08A; Charge Authorization; Receipt</p> | | |

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering information, preparing, and submitting the completed form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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| | | | | | |
|--|--------------|---|--|--|-----------|
| U.S. APPLICATION NO. (if known, see 37 CFR 1.5) | | INTERNATIONAL APPLICATION NO. PCT/IB2003/005938 | | ATTORNEY'S DOCKET NUMBER PHUS020557 | |
| The following fees have been submitted | | | | CALCULATIONS PTO USE ONLY | |
| 21. <input checked="" type="checkbox"/> Basic national fee..... \$300 | | | | \$ 300.00 | |
| 22. <input checked="" type="checkbox"/> Examination fee If International preliminary examination report prepared by USPTO and all claims satisfy provisions of PCT Article 33(1)-(4)..... \$100 All other situations..... \$200 | | | | \$ 200.00 | |
| 23. <input checked="" type="checkbox"/> Search fee Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority..... \$100 International Search Report prepared and provided to the Office..... \$400 All other situations..... \$500 | | | | \$ 400.00 | |
| TOTAL OF 21, 22 and 23 = | | | | \$ 900.00 | |
| <input type="checkbox"/> Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing or computer program listing filed in an electronic medium). The fee is \$250 for each additional 50 sheets of paper or fraction thereof. | | | | | |
| Total Sheets | Extra Sheets | Number of each additional 50 or fraction thereof (round up to a whole number) | | RATE | |
| - 100 = | /50 = | | | x \$250 | \$ |
| Surcharge of \$130.00 for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(h)). | | | | \$ | |
| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | \$ | |
| Total claims | 17 - 20 = | | x \$ 50 | \$ 0.00 | |
| Independent claims | 3 - 3 = | | x \$200 | \$ 0.00 | |
| MULTIPLE DEPENDENT CLAIM(S) (if applicable) | | | + \$360 | \$ | |
| TOTAL OF ABOVE CALCULATIONS = | | | | \$ 0.00 | |
| <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by 1/3. | | | | | |
| SUBTOTAL = | | | | \$ 900.00 | |
| Processing fee of \$130.00 for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). | | | | \$ | |
| TOTAL NATIONAL FEE = | | | | \$ 900.00 | |
| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property | | | | \$ 40.00 | |
| TOTAL FEES ENCLOSED = | | | | \$ 940.00 | |
| | | | | Amount to be refunded: | \$ |
| | | | | Amount to be charged: | \$ 940.00 |
| <p>a. <input type="checkbox"/> A check in the amount of \$ _____ to cover the above fees is enclosed.</p> <p>b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. <u>14-1270</u> in the amount of \$ <u>940.00</u> to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>14-1270</u>. A duplicate copy of this sheet is enclosed.</p> <p>d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p> | | | | | |
| NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status. | | | | | |
| SEND ALL CORRESPONDENCE TO: | | | | | |
| Corporate Patent Counsel Philips Electronics North America Corporation P.O. Box 3001 Briarcliff Manor, NY 10510 | | |  SIGNATURE Aaron Waxler NAME 48,027 REGISTRATION NUMBER | | |

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

To Commissioner For Patents

Enclosed herewith is a Form PTO-1449, any required copies of documents listed thereon, and any concise explanation of their relevance is indicated below per 37 CFR 1.97.

| | |
|------------------------|-------------------|
| Application Number | |
| Filing Date | CONCURRENTLY |
| First Named Inventor | SALEH OSMAN ET AL |
| Group Art Unit | N/A |
| Examiner Name | N/A |
| Attorney Docket Number | US020557 |

☒ Please charge any required fee under §1.17(i) or §1.17(p) or any other required fee (except the issue fee) to Account No. 14-1270.

- ☐ I certify that these documents were first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three (3) months ago.
- ☐ I certify that none of these documents were cited in any communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, none of these documents was known to any individual designated in §1.56(c) more than three (3) months ago.

☐ Applicant hereby petitions under §1.97(d) that this IDS be considered after final Action or Notice of Allowance, pays the fee under §1.17(p) as indicated below, and I certify 1. or 2. as indicated above.

☐ A fee under §1.17(p) is not required under §1.97(c), after the first Action on the merits and more than (3) months after the date of application or RCE, because I certify 1. or 2. as indicated above.

☐ A copy of the citations is not required because they were previously submitted or cited in the parent application (or in U.S. patent application Ser. No. _____ Filing Date _____ relied on for an earlier effective filing date under 35 U.S.C. 120).

☒ A copy of the U.S. patent(s) and patent application publication(s) in all U.S. national patent applications filed after June 30, 2003, and in all international applications that have entered the national stage under 35 USC § 371 after June 30, 2003 under 37 CFR 1.491(b), are not required.

☐ A concise explanation of the relevance of each non-English document, as understood by the individual designated in §1.56(c) most knowledgeable about the contents, is enclosed per §1.98(a)(3).

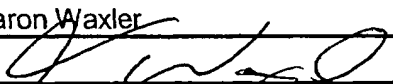
The concise explanation of the relevance of any non-English document, as understood by the individual designated in §1.56(c) most knowledgeable about the contents, is that the document is/was:

☒ cited in the specification or considered in drafting the specification of this application;

☐ previously submitted or cited in the parent application (or in a related patent application Ser. No. _____ Filing Date: _____);

☐ cited as an "X" or "Y" document in a foreign Patent Office search report in a foreign counterpart application, a copy of which report is also enclosed.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

| | | | |
|-------------------|---|-----------------------------------|---------|
| Name (Print Type) | Aaron Waxler | Registration No. (Attorney/Agent) | 48,027 |
| Signature |  | Date | 6/19/06 |

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1

of 1

Complete if Known

| | |
|------------------------|-------------------|
| Application Number | |
| Filing Date | Concurrently |
| First Named Inventor | SALEH OSMAN ET AL |
| Art Unit | N/A |
| Examiner Name | N/A |
| Attorney Docket Number | US020557 |

U. S. PATENT DOCUMENTS

[illegible]

FOREIGN PATENT DOCUMENTS

[illegible]

| | | | |
|-----------------------|--|--------------------|--|
| Examiner Signature | | Date Considered | |
|-----------------------|--|--------------------|--|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹ Applicant's unique citation designation number (optional). ² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁶ Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

US020557

Serial No.

Group Art Unit

Filed: CONCURRENTLY

Ex.

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE

Commissioner for Patents
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Prior to calculation of the filing fee and examination, please
amend the above-identified application as follows:

IN THE SPECIFICATION

Please add the following paragraph before the first paragraph beginning at page 1, line 1:

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. provisional application serial no. 60/432,897 filed December 12, 2002, which is incorporated herein by reference.


The invention relates to an isolator-free power amplifier circuit typically used in wireless communication devices which preserves linearity of the power amplifier under varying loads. More particularly, linearity is preserved by dynamically adjusting the gain by changing the input bias of active devices of the power amplifier circuit, and/or by dynamically adjusting the phase of a pre-amplified signal.

REMARKS

By means of the present amendment, the specification has been amended to include a claim of priority.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Respectfully submitted,

By 
Aaron Waxler, Reg. 48,027
Attorney
(914) 333-9608

| | | |
|---|--------------------------|-------------|
| DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input checked="" type="checkbox"/> Declaration Submitted With Initial Filing OR <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required) | Attorney Docket Number | PH08020557 |
| | First Named Inventor | SALEH OSMAN |
| | COMPLETE IF KNOWN | |
| | Application Number | / |
| | Filing Date | |
| | Group Art Unit | |
| | Examiner Name | |

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY DYNAMICALLY ADJUSTING GAIN AND PHASE

the specification of which (Title of the Invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International

Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT International application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) Country | Priority Not Claimed | Certified Copy Attached? | |
|-------------------------------------|---------|--|--------------------------|--------------------------|--------------------------|
| | | | | YES | NO |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

DECLARATION — Utility or Design Patent Application

| | | | | | |
|---|--|---|----------------|----------------------------------|--|
| Direct all correspondence to: | | <input checked="" type="checkbox"/> Customer Number or Bar Code Label | *24737* | OR | <input checked="" type="checkbox"/> Correspondence address below |
| Phillips Electronics North America Corporation | | | | | |
| Name | | | | | |
| P.O. BOX 3001 | | | | | |
| Address | | | | | |
| BRIARCLIFF MANOR | | NY | 10510 | | |
| City | | State | ZIP | | |
| U.S.A. | | (914) 945-6000 | (914) 332-0615 | | |
| Country | | Telephone | Fax | | |
| I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. | | | | | |
| NAME OF SOLE OR FIRST INVENTOR: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) | | SALEH | | Family Name or Surname | |
| | | | | OSMAN | |
| Inventor's Signature | | | | Date | |
| NORWOOD | | MA | USA | GREAT BRITAIN | |
| Residence: City | | State | Country | Citizenship | |
| 2906 VILLAGE ROAD WEST | | | | | |
| Mailing Address | | | | | |
| NORWOOD | | MA | 02062 | USA | |
| City | | State | Zip | Country | |
| NAME OF SECOND INVENTOR: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | |
| Given Name (first and middle [if any]) | | RICHARD F. | | Family Name or Surname | |
| | | | | KEENAN | |
| Inventor's Signature | | | | Date | |
| <i>Richard F. Keenan</i> | | | | 3/5/04 | |
| MEDWAY Whitinsville R.K. | | MA | USA | USA | |
| Residence: City | | State | Country | Citizenship | |
| 280 VILLAGE STREET UNIT 61 | | | | | |
| Mailing Address | | | | | |
| MEDWAY Whitinsville R.K. | | MA | 02053 R.K. | USA | |
| City | | State | Zip | Country | |
| | | | 01588 | | |
| <input type="checkbox"/> Additional inventors are being named on the 1 ST PAGE supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto. | | | | | |

Please type a plus sign (+) inside this box -



Appn or use through 10/31/2002. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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DECLARATION
ADDITIONAL INVENTOR(S)
 Supplemental Sheet
 Page 1 of 1

| | | | |
|--|------------|---|-----|
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| JAROSLAW | | LUCEK | |
| Inventor's Signature | | Date | |
| Residence: City | CUMBERLAND | State | RI |
| Country | USA | Citizenship | USA |
| Mailing Address 40 GREEN MEADOW LANE | | | |
| Mailing Address | | | |
| City | CUMBERLAND | State | RI |
| ZIP | 02864 | Country | USA |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | | State | |
| Country | | Citizenship | |
| Mailing Address | | | |
| Mailing Address | | | |
| City | | State | |
| Zip | | Country | |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle [if any]) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | | State | |
| Country | | Citizenship | |
| Mailing Address | | | |
| Mailing Address | | | |
| City | | State | |
| Zip | | Country | |

Burden Hour Statement: This form is estimated to take 21 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

| | | |
|---|--------------------------|-------------|
| DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input checked="" type="checkbox"/> Declaration Submitted With Initial Filing OR <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required) | Attorney Docket Number | PHUS020557 |
| | First Named Inventor | SALEH OSMAN |
| | COMPLETE IF KNOWN | |
| | Application Number | / |
| | Filing Date | |
| | Group Art Unit | |
| | Examiner Name | |

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY DYNAMICALLY ADJUSTING GAIN AND PHASE

the specification of which (Title of the Invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) as United States Application Number or PCT International

Application Number and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or of any PCT international application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) | Country | Priority Not Claimed | Certified Copy Attached? | |
|-------------------------------------|---------|----------------------------------|---------|--------------------------|--------------------------|--------------------------|
| | | | | | YES | NO |
| | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

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DECLARATION — Utility or Design Patent Application

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| Direct all correspondence to: | | <input checked="" type="checkbox"/> Customer Number or Bar Code Label | | *24737* | | OR | | <input checked="" type="checkbox"/> Correspondence address below | | |
| Philips Electronics North America Corporation | | | | | | | | | | |
| Name | | | | | | | | | | |
| P.O. BOX 3001 | | | | | | | | | | |
| Address | | | | | | | | | | |
| BRIARCLIFF MANOR | | | | NY | | 10510 | | | | |
| City | | | | State | | ZIP | | | | |
| U.S.A. | | | | (914) 945-6000 | | (914) 332-0615 | | | | |
| Country | | | | Telephone | | Fax | | | | |
| I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. | | | | | | | | | | |
| NAME OF SOLE OR FIRST INVENTOR: | | | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | | | | |
| Given Name (first and middle [if any]) | | | | SALEH | | Family Name or Surname | | | | OSMAN |
| Inventor's Signature | | | | | | Date | | | | |
| NORWOOD | | | | MA | | USA | | GREAT BRITAIN | | |
| Residence: City | | | | State | | Country | | Citizenship | | |
| 2906 VILLAGE ROAD WEST | | | | | | | | | | |
| Mailing Address | | | | | | | | | | |
| NORWOOD | | | | MA | | 02062 | | USA | | |
| City | | | | State | | Zip | | Country | | |
| NAME OF SECOND INVENTOR: | | | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | | | | | | |
| Given Name (first and middle [if any]) | | | | RICHARD F. | | Family Name or Surname | | | | KEENAN |
| Inventor's Signature | | | | | | Date | | | | |
| MEDWAY | | | | MA | | USA | | USA | | |
| Residence: City | | | | State | | Country | | Citizenship | | |
| 280 VILLAGE STREET UNIT G1 | | | | | | | | | | |
| Mailing Address | | | | | | | | | | |
| MEDWAY | | | | MA | | 02053 | | USA | | |
| City | | | | State | | Zip | | Country | | |
| <input type="checkbox"/> Additional Inventors are being named on the <u>1ST</u> PAGE supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto. | | | | | | | | | | |

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Approved for use through 10/31/2002. OMB 0651-0032

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DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet
Page 1 of 1

| | | | |
|--|-----------------|---|------------------------|
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle (if any)) | | Family Name or Surname | |
| JAROSLAW | | LUCEK | |
| Inventor's Signature <i>Jaroslav Lucek</i> | | Date <i>12-08-03</i> | |
| Residence: City <i>CUMBERLAND GREENSBORO</i> | State <i>NC</i> | Country <i>USA</i> | Citizenship <i>USA</i> |
| Mailing Address <i>40 GREEN MEADOW LANE 307 TOWER LN</i> | | | |
| Mailing Address | | | |
| City <i>CUMBERLAND GREENSBORO</i> | State <i>NC</i> | ZIP <i>27410</i> | Country <i>USA</i> |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle (if any)) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
| Residence: City | State | Country | Citizenship |
| Mailing Address | | | |
| Mailing Address | | | |
| City | State | Zip | Country |
| Name of Additional Joint Inventor, if any: | | <input type="checkbox"/> A petition has been filed for this unsigned inventor | |
| Given Name (first and middle (if any)) | | Family Name or Surname | |
| | | | |
| Inventor's Signature | | Date | |
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| Mailing Address | | | |
| Mailing Address | | | |
| City | State | Zip | Country |

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PCT

From the INTERNATIONAL BUREAU

NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

KONINKLIJKE PHILIPS ELECTRONICS N.V.
c/o Biren, Steven R.
P.O. Box 3001
Briarcliff Manor, NY 10510-8001
ETATS-UNIS D'AMERIQUE

| | | |
|---|---|---|
| Date of mailing (day/month/year) 24 June 2004 (24.06.2004) | | |
| Applicant's or agent's file reference PHUS020557WO | | IMPORTANT NOTICE |
| International application No. PCT/IB2003/005938 | International filing date (day/month/year) 10 December 2003 (10.12.2003) | Priority date (day/month/year) 12 December 2002 (12.12.2002) |
| Applicant KONINKLIJKE PHILIPS ELECTRONICS N.V. et al | | |

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this notice:

AU, AZ, BY, CH, CN, CO, DZ, EP, HU, JP, KG, KP, KR, MD, MK, MZ, RU, TM, US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE, AG, AL, AM, AP, AT, BA, BB, BG, BR, BZ, CA, CR, CU, CZ, DE, DK, DM, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, ID, IL, IN, IS, KE, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, SC, SD, SE, SG, SK, SL, SY, TJ, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this notice is a copy of the international application as published by the International Bureau on 24 June 2004 (24.06.2004) under No. WO 2004/054097

4. **TIME LIMITS for filing a demand for international preliminary examination and for entry into the national phase**

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 19 months from the priority date, but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see *PCT Gazette* No. 44/2001 of 1 November 2001, pages 19926, 19932 and 19934, as well as the *PCT Newsletter*, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

For filing a demand for international preliminary examination, see the *PCT Applicant's Guide*, Volume I/A, Chapter IX. Only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

It is the applicant's sole responsibility to monitor all these time limits.

| | |
|---|---|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland | Authorized officer Gabriele Bähr |
| Facsimile No. +41 22 740 14 35 | Facsimile No. +41 22 338 70 60 |

PC JUN 30 2004

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 June 2004 (24.06.2004)

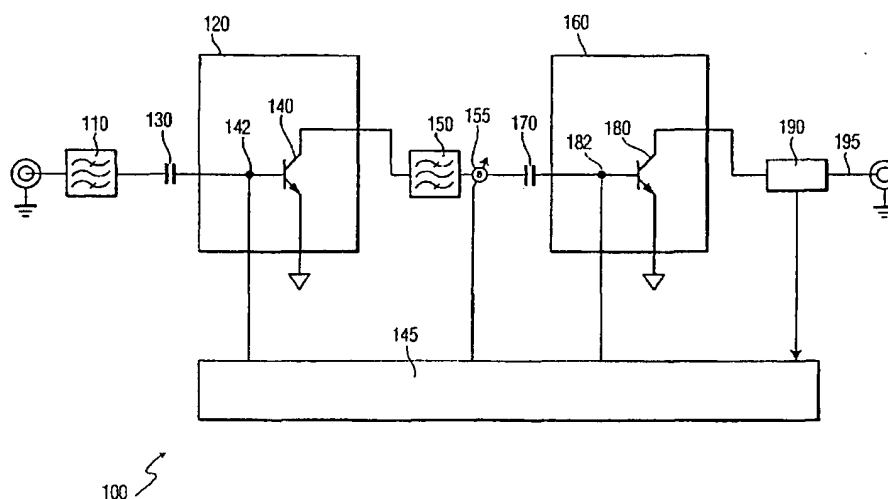
PCT

(10) International Publication Number
WO 2004/054097 A1

- (51) International Patent Classification⁷: **H03F 1/56**, (74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o Biren, Steven R., P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
H03G 3/20, H03F 1/02
- (21) International Application Number: PCT/IB2003/005938
- (22) International Filing Date: 10 December 2003 (10.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/432,897 12 December 2002 (12.12.2002) US
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **OSMAN, Saleh** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US). **KEENAN, Richard, F.** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US). **LUCEK, Jaroslaw** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations

[Continued on next page]

(54) Title: PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY DYNAMICALLY ADJUSTING GAIN AND PHASE



(57) Abstract: An amplifier circuit (100) includes a driver stage (120) with at least an active device (140) for pre-amplification and output of a pre-amplified signal; and an output stage (160) with at least an active device (180) for further amplification of the pre-amplified signal and output of an amplified signal. A phase shifter (155) shifts the phase of the pre-amplified signal. A detector (190) measures levels of forward and reflected parts of the amplified signal, and a gain and phase control circuit (145) independently and selectively controls and adjusts the phase shifter (155) for optimal amplifier performance and minimal difference between the forward and reflected signals. The gain and phase control circuit also independently and selectively controls and modifies the gain of the active devices (140, 180) of the driver and output stages (120, 160) as a function of the levels of the forward and reflected signals to substantially maintain constant linearity of the amplifier circuit (100) with load variations.

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PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE

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The invention relates to an isolator-free power amplifier circuit typically used in wireless communication devices which preserves linearity of the power amplifier under varying loads. More particularly, linearity is preserved by dynamically adjusting the gain by changing the input bias of active devices of the power amplifier circuit, and/or by
10 dynamically adjusting the phase of a pre-amplified signal.

Power amplifiers are used in transmitters to amplify signals, such as radio frequency (RF) signals. Such power amplifiers are included in transmitters of wireless communication devices, such as mobile telephones. The power amplifier typically provides an amplified RF signal to an antenna for transmission over the air.

15 RF antennas as for instance applied in mobile phones, operate in strongly varying environments, resulting in a varying antenna input impedance, a VSWR (Voltage Standing Wave Ratio) of 4:1 is not uncommon. Especially at high output levels, this may result in a severe distortion of for instance a CDMA (code division multiple access), TDMA (time division multiple access), Edge or W-CDMA modulated carrier signal having a non-
20 constant envelope.

The conventional solution to protect the power amplifier of a cellular phone against antenna mismatch conditions to preserve linearity is to use an isolator, such as a circulator, placed between the power amplifier and the output load, such as the antenna, to limit the effects of load impedance variation on the performance of the power amplifier. The
25 circulator secures proper 50 Ohm loading of the power amplifier under antenna mismatch conditions by dissipating the reflected power in the isolator or in a third circulator port termination. Directivity in the power flow is created by ferromagnetic material.

The above aspects of the state of the art are described in more detail with reference to Fig. 1 which shows a basic block diagram of an arrangement 10 used for a power source
30 12 isolated with a circulator 14 from a mismatched antenna 16. A current source 18 and its impedance Z_0 represent an ideal power source (RF-transistor) 12. A matching circuit 20 is

connected between the antenna 16 and power source 12, with another terminal 22 connected to ground.

Part of the power P_{inc_circ} from the matching circuit 20 to the circulator 14 is delivered as P_{inc_ant} to the antenna 16 where some power is reflected back P_{refl_ant} to the circulator 14. Thanks to the circulator 14, the reflected power P_{refl_ant} from the antenna 16 is not reflected towards the source 12, but dissipated into the circulator load P_{diss} . Consequently, the reflected power P_{refl_circ} from the circulator 14 and the reflected power P_{refl_source} from the matching circuit 20 towards the source 12 are zero. This avoids extremes that would occur when incident and reflected waves add up in-phase. However, since it is desired to preserve power amplifier linearity and maintain Prad constant (under control of field strength indication at the base station), then the incident power P_{inc_source} from the source 12 has to be increased, thus increasing power dissipation, to overcome reflection losses resulting in enhanced signal voltage and current at the source 12. Thus, the circulator 14 only partly preserves power amplifier linearity under antenna mismatch conditions. In addition, power dissipation and consumption remains high thus requiring battery charging and decreasing battery life of the mobile phone as well as decreasing efficiency.

It is desirable to remove the isolator or circulator 14 connected to the antenna 16. However, removal of the isolator allows load impedance variations to detrimentally affect the performance, e.g., linearity, of the power amplifier. Accordingly, there is a need to have a power amplifier circuit where the isolator is removed yet the performance and linearity of the amplifier is preserved despite load impedance variations.

According to the invention, linear power output of a power amplifier is substantially maintained constant despite load variations and having no isolator connected to the load. This is achieved by dynamically adjusting the gain of active devices and phase of signals in an isolator-less power amplifier circuit as a correction scheme for linearity under predetermined load mismatch conditions. Thus, linear output power is kept unchanged for a predetermined load delta across the dynamic range of operation, without substantially decreasing efficiency. More particularly, linearity is substantially maintained constant despite load variations by independently and selectively adjusting the gain of the active devices of driver and output stages as a function of the levels of the forward and reflected output signals. Further, the phase of a pre-amplified signal is independently and

selectively adjusted as a function of the levels of the forward and reflected output signals to substantially maintain constant linearity of amplifier circuit with load variations.

In one embodiment according to the present invention, an amplifier circuit for preserving linearity of an amplifier is provided. The amplifier circuit may be used in
5 wireless communication devices, for example. The amplifier circuit includes a driver stage with at least an active device for pre-amplification and output of a pre-amplified signal; and an output stage with at least an active device an active device for further amplification of the pre-amplified signal and output of an amplified signal. A phase shifter shifts the
10 phase of the pre-amplified signal. A detector measures levels of forward and reflected parts of the amplified signal, and a gain and phase control circuit independently and selectively controls and adjusts the phase shifter for optimal amplifier performance and maximum difference or ratio between the forward and reflected signals. The gain and
phase control circuit also independently and selectively controls and modifies the gain of the active devices of the driver and output stages as a function of the levels of the forward
15 and reflected signals to substantially maintain linearity of amplifier circuit with load variations.

In another embodiment according to the present invention, a method for substantially preserving linearity of an amplifier under varying loads is provided. The method includes measuring levels of forward and reflected signals at the amplifier output;
20 and adjusting the phase of a pre-amplified signal for optimal amplifier performance and maximum difference or ratio difference between the forward and reflected signals as a function of the measured levels, such as the difference or ratio of the measured forward and reflected signals. The method further includes independently and selectively adjusting the gain of the active devices of the driver stage and/or output stage, such as by selectively
25 adjusting the DC bias at the input of the active devices, as a function of the levels of the forward and reflected signals to substantially maintain linearity of amplifier circuit with load variations.

Further features and advantages of the invention will become more readily apparent from a consideration of the following description.

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The accompanying drawings specify and show preferred embodiments of the invention, wherein like elements are designated by identical references throughout the drawings; and in which:

5 Fig. 1 shows a prior art block diagram of a power source isolated with a circulator from a mismatched antenna;

 Fig. 2 shows a wireless communication system according to the present invention;

 Fig. 3 shows an isolator-free amplifier circuit according to the present invention;

 Fig. 4 shows a flow chart of a method for preserving performance, e.g., linearity, of
10 an isolator-free amplifier circuit according to the present invention; and

 Fig. 5 shows a summarized flow chart of the method for preserving performance, e.g., linearity, of an isolator-free amplifier circuit according to the present invention.

 The invention, together with attendant advantages, will be best understood by reference to the following detailed description of the preferred embodiment of the
15 invention, taken in conjunction with the accompanying drawing.

 An amplifier circuit for use in wireless communication devices for example is described where, illustratively, an RF power amplifier is used in RF antenna circuits. In the following description, numerous specific details are set forth, such as specific type and number of transistors, in order to provide a thorough understanding of the present
20 invention. However, it will be obvious to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well known circuits have not been set forth in detail in order to not unnecessarily obscure the present invention.

 The wireless communication device may be for example a mobile cellular or cordless telephone, pager, an Internet appliance or other consumer devices, and is typically
25 part of a communication system. Fig. 2 shows a wireless communication system, such as a mobile telephone system 40 comprising a primary or base station (BS) 50 and a plurality of secondary or mobile stations (MS) 60. The BS 50 comprises a network controller 52, such as a computer, coupled to a transceiver 54 which is in turn coupled to radio transmission means such as an antenna 56. A connection means such as a wire 58 couples the controller
30 52 to a public or a private network.

 Each MS 60 comprises a processor 62 such as a micro-controller (μ C) and/or a digital signal processor (DSP). Typically, the DSP processes voice signals, while the μ C

manages operation of the MS 60. The processor 62 is coupled to a transceiver means 64 coupled to radio transmission means, e.g., an antenna 66. A memory 68, such as an EPROM and RAM, is coupled to the processor 62 and stores data related to operation and configuration of the MS 60. Communication from the BS 50 to MS 60 takes place on a downlink channel 72, while communication from the MS 60 to BS 50 takes place on an uplink channel 74. The MS 60 also includes a user interface such as a keyboard and a screen, as well as a microphone coupled to the transmit branch or section of the transceiver 64 and a speaker coupled to the receiver section of the transceiver 64.

The transmit section of the transceiver 64 transmits signals over the uplink channel 74, which the receive branch of the transceiver 64 receives signals over the downlink channel 72. The transceiver 64 includes a selection means to selectively couple a power amplifier (PA) of the transmit section or a low noise amplifier (LNA) of the receive section to the antenna 66. Illustratively, the selection means includes a duplexer or bandpass filters tuned to the transmit and receive frequency ranges, respectively. As is well known in the art, the transceiver 64 also includes other circuits such as a down converter for converting the received radio frequency (RF) signals to intermediate frequency and/or baseband signals, and demodulator/decoder in the receive branch. By contrast, the transmit branch of the transceiver 64 includes an up converter and a modulator/encoder. Converters that convert between analog and digital formats are also typically present in the transceiver 64.

Fig. 3 shows an embodiment of an amplifier circuit 100 according to the present invention which is illustratively used as a power amplifier circuit to amplify RF signals in wireless communication devices. For example, the amplifier circuit 100 is part of the transceiver 64 of the MS 60 shown in Fig. 2, and more particularly, in the transmit branch of the transceiver 64. Typically, the input of the amplifier circuit is coupled to a modulator and receives modulated RF signals for amplification. The amplifier output is coupled to a load, such as the antenna 66, where the amplified RF signals are transmitted over the air on the uplink channel 74 for example.

As shown in Fig. 3, the amplifier circuit 100 comprises an input match circuit 110 for buffering the input of the amplifier circuit 100 and matching its input impedance with the output impedance of the circuit coupled thereto, such as a modulator. The output of the input match circuit 110 is coupled to a driver stage 120 through at least one direct current (DC) blocking capacitor 130. The signal to be amplified, such as a modulated signal, is

provided by the input match circuit 110 to the capacitor 130, which substantially blocks DC components and provides a signal substantially without a DC offset to the driver stage 120.

5 The driver stage 120 comprises at least one active device, such as a transistor 140, which receives the substantially DC-free signal from the capacitor 130 for pre-amplification to a first level. Illustratively, the pre-amplification transistor is a bipolar transistor, such as an NPN transistor 140 having a base 142 coupled to the capacitor 130. The base 142 is further independently coupled to a gain and phase control circuit 145 for a proper DC biasing signal. This allows the control circuit 145 to control, e.g., adjusts the
10 DC bias at the input of the transistor 140. The emitter of the transistor 140 is coupled to ground, while the output or collector of the transistor 140 is coupled to an inter-stage match circuit 150 for buffering and impedance matching between the driver stage 120 and the input 182 of an output stage 160.

The pre-amplified signal from the driver stage 120 is provided to the input 182 of
15 the output stage 160 through the inter-stage match circuit 150, a phase shifter 155 which shifts the phase of the pre-amplified signal, and at least one DC blocking capacitor 170 for substantially blocking DC signals present in the pre-amplified and phase-shifted signal, similar to the DC blocking capacitor 130.

The output stage 160 is similar to the driver stage 120 and also comprises at least
20 one transistor 180 which receive the substantially DC-free signal from the capacitor 170 for amplification to the output level. Illustratively, the output transistor 180 is a bipolar transistor, such as an NPN transistor having a base coupled to the capacitor 170. The base 182 of the output transistor 180 is further coupled to the control circuit 145 for providing the proper DC biasing signal the output transistor 180. The emitter of transistor 180 is
25 coupled to ground, while the output or collector of the transistor 180 is directly or indirectly coupled to the load without any isolation therebetween. Further, the emitter area of each active device 140, 180 is selected such that optimum performance is achieved for a given load, inter-stage and source conditions.

In addition to being coupled to the inputs 142, 182 of the transistors 140, 180, the
30 control circuit 145 is also coupled to a control port of the phase shifter 155. Accordingly, the control circuit 145 is configured to provide control signals for independently and selectively controlling the phase shifter 155 and transistors 140, 180. This allows the bias

control circuit 145 to independently and selectively adjust the amount phase shifting of the pre-amplified signal and the DC bias at the input transistors 140, 180, thus adjusting the amplification or gain of the driver and output stages 120, 160.

By way of example, suppose a power amplifier is to deliver 30 dBm of output power to a 50 ohm load. If the power amplifier's final stage's output has peak voltage swing of 1.4 volts for linear operation, then a loss-less impedance matching network separating load and power amplifier must have an impedance transformation ratio of 51:1.

Consider a worst case mismatch condition over all phases of a constant VSWR. The two impedance extremes are high and low loads. In the former case, large voltage swings develop across the output of the final stage causing non-linearity in the form of clipping due to the onset of high AC impedance. In the later case, the demand for output current elevates due to the onset of low AC impedance. By monitoring the incident and reverse power levels, a measurement of the impedance condition is obtained as shown in block 200 of Fig. 4. Next in block 210, the impedance level or mismatch is checked and if a normal or matched level is obtained, then normal matched operation is continued in block 220. If the impedance level or mismatch is not normal, then it is determined in block 230 whether the difference or ratio of the measured forward and reflected signals is high, indicating a relatively high forward signal, or low indicating a relatively low forward signal. Next, in block 240, the phase shifter and the input DC bias of each driver and output transistor are independently and selectively adjusted in one direction or the other, depending on whether the ratio measured in block 230 was high or low. Next, the impedance condition is re-measured by returning to block 200 and the operations are repeated until a matched level is obtained in block 210 and normal matched operation is continued in block 220. The monitoring and measurement of the impedance in block 200 are continuously or intermittently checked and adjustments are made, if needed, to arrive to the matched condition of block 220.

A detector, such as a power detector 190, is also coupled to the output of transistor 180 for detecting the level, e.g., the power level, of the amplified RF signal at the output of the output stage 160. The power detector 190 is in turn coupled to the control circuit 145. The output 195 of the amplifier circuit 100 is coupled to an antenna without an isolator therebetween.

The power detector 190 provides the control circuit 145 a measure of the forward and reflected output power of the amplifier circuit 100. As a function of the forward and reflected power levels, the control circuit 145 independently and selectively controls the phase shifter 155 and each of transistor 140, 180 of the driver and output stages 120, 160 to substantially maintain the optimum performance and constant linearity of the amplifier circuit 100 despite variations in the impedance of the load connected to the output 195 of the amplifier circuit 100. For example, in response to the difference between the forward and reflected power level in response to the difference between the forward and reflected power level, the control circuit 145 independently and selectively controls the phase shifter 155 and changes the DC bias on the input e.g., base 142, 182, of each driver and output transistor 140, 160. This substantially maintains linear output power despite load variations without significantly modifying the output stage of the power amplifier circuit.

As is well known by one skilled in the art, the changes in the forward and reflected power levels measured by the power detector 190 are related to changes in the load impedance, e.g., the impedance of the antenna 66 shown in Fig. 2. In particular, for a load impedance substantially matched to the output impedance of the output of the amplifier circuit 100, the ratio or the difference between the forward and reflected power levels is high, while it is low for substantially mismatched impedances. U.S. Patent No. 5,423,082, which is incorporated herein by reference in its entirety, discloses a transmitter that includes a closed loop feedback to compensate for varying antenna loads without an isolator, which is accomplished by taking the reflected output energy into account to maintain a constant overall loop gain by adjusting the gain of variable gain stages.

Control circuits are also well known in the art, such as the control circuit disclosed in U.S. Patent Nos. 5,442,322 and 5,712,593 which are incorporated herein by reference in its entirety. In U.S. Patent No. 5,442,322, a bias control circuit compares a bias control voltage with a value indicative of the current in an active device and provides a control signal to the control terminal of the active device to control the operating point thereof. The bias point of a power amplifier is similarly controlled in U.S. Patent No. 5,712,593 by a control circuit in response to comparing a reference value to a filtered portion of the RF output signal. Changing the amplifier bias point limits the effect of the load impedance variation on the amplifier performance. U.S. Patent No. 6,064,266, which is incorporated herein by reference in its entirety, is also related to limiting the effect of the load

impedance variation on the amplifier performance, which is achieved by modifying the RF output signal path, instead of the DC bias, by switching in a resistor in parallel with the output impedance when a threshold detector detects variations in the load impedance above a predetermined value. Phase shifters are also well known in the art, as disclosed in U.S.

- 5 Patent No. 4,312,032, which is incorporated herein by reference in its entirety.

The control circuit 145 of the present amplifier circuit 100 may include a processor or a comparator for comparing the values of forward and reflected power levels measured by the power detector 190 with at least one threshold value. Based on the comparison, the control circuit 145 selectively and independently controls modifies the DC levels at the
10 inputs 142, 182 of the transistors 140, 180, as well as controlling the phase shifter 155 to change the phase of the pre-amplified signal as necessary, namely, as a function of the levels of the forward and reflected signals, to substantially maintain constant the linearity of the amplifier circuit 100 with load variations.

Fig. 5 shows a flow chart 300 of a method for preserving performance of an
15 isolator-free amplifier circuit according to the present invention. In block 310, the power detector measures the forward and reflected power levels at the output of the amplifier circuit and provides this information to the control circuit 145. In response to the measured forward and reflected power levels, such as their difference or ratio values, in block 320, the control circuit 145 selectively and independently controls the phase shifter 155 to
20 change the phase of the pre-amplified signal, and/or modifies the gain, e.g., by changing the base DC bias, of the input and/or output transistors 140, 180, as a function of the measured forward and reflected power levels to substantially maintain optimal performance and constant linearity of the amplifier circuit 100 with load variations.

While the present invention has been described in particular detail with reference to
25 specific exemplary embodiments thereof, it should also be appreciated that numerous modifications and changes may be made thereto without departing from the broader and intended spirit and scope of the invention as set forth in the claims that follow. The specification and drawings are accordingly to be regarded in an illustrative manner and are not intended to limit the scope of the claims which follow.

CLAIMS:

1. An amplifier circuit comprising:
 - 5 a driver stage having at least a first active device which receives a signal for pre-amplification and outputs a pre-amplified signal;
 - a phase shifter which adjusts a phase of said pre-amplified signal and outputs a phase-shifted signal;
 - an output stage having at least a second active device which receives said phase-
 - 10 shifted signal for further amplification and output of an amplified signal;
 - a detector which measures levels of forward signal and reflected signal of said amplified signal; and
 - a control circuit which controls said phase shifter in response to said levels of forward signal and reflected signal to substantially maintain linearity of said amplifier
 - 15 circuit with load variations.
2. The amplifier circuit of claim 1, wherein said output stage is coupled to a load without an isolation device between said output stage and said load.
- 20 3. The amplifier circuit of claim 1, wherein said control circuit modifies a gain of at least one of said at least first active device and said at least second active device to substantially maintain said linearity of said amplifier circuit with said load variations.
4. The amplifier circuit of claim 1, wherein said control circuit independently controls
- 25 said at least first active device and said at least second active device.
5. The amplifier circuit of claim 1, wherein said control circuit independently controls said phase shifter, said at least first active device and said at least second active device to substantially maintain said linearity of said amplifier circuit with said load variations.
- 30 6. The amplifier circuit of claim 1, wherein said at least first active device and said at least second active device are NPN transistors.

7. The amplifier circuit of claim 1, further comprising an input match circuit coupled between an input of said amplifier circuit and said driver stage for matching an input impedance of said amplifier circuit to an output impedance of a device coupled to said input.
8. The amplifier circuit of claim 7, further comprising at least one capacitor coupled between said input match circuit and said driver stage.
9. The amplifier circuit of claim 1, further comprising at least one capacitor coupled between an input of said amplifier circuit and said driver stage.
10. The amplifier circuit of claim 1, further comprising an inter-stage match circuit coupled between an output of said driver stage and an input of said phase shifter.
11. The amplifier circuit of claim 10, further comprising at least one capacitor coupled between said phase shifter and said output stage.
12. The amplifier circuit of claim 1, further comprising at least one capacitor coupled between said phase shifter and said output stage.
13. A wireless communication device comprising the amplifier circuit of claim 1.
14. An amplifier circuit comprising:
- a driver stage having at least a first active device which receives a signal for pre-amplification and outputs a pre-amplified signal;
 - a phase shifter which adjusts a phase of said pre-amplified signal and outputs a phase-shifted signal;
 - an output stage having at least a second active device which receives said phase-shifted signal for further amplification and output of an amplified signal;
 - a detector which measures levels of forward signal and reflected signal of said amplified signal; and

a control circuit which independently and selectively controls switching said phase shifter, said at least first active device, and said at least second active device as a function of said levels of forward signal and reflected signal to substantially maintain linearity of said amplifier circuit with load variations.

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15. A method for substantially maintaining linearity of an amplifier circuit with variations of a load coupled to an output of said amplifier circuit comprising:

measuring levels of forward signal and reflected signal at said output; and

modifying a phase shifter to change a phase of an output signal of said amplifier

10 circuit as a function of said levels to substantially maintain linearity of said amplifier circuit with load variations.

16. The method of claim 15, wherein said modifying act further modifies a first gain of a first active device of a driver stage, and a second gain of a second active device of an
15 output stage of said amplifier circuit in response to said levels to substantially maintain said linearity.

17. The method of claim 16, wherein said modifying act independently and selectively modifies said phase shifter, said first gain and a second gain.

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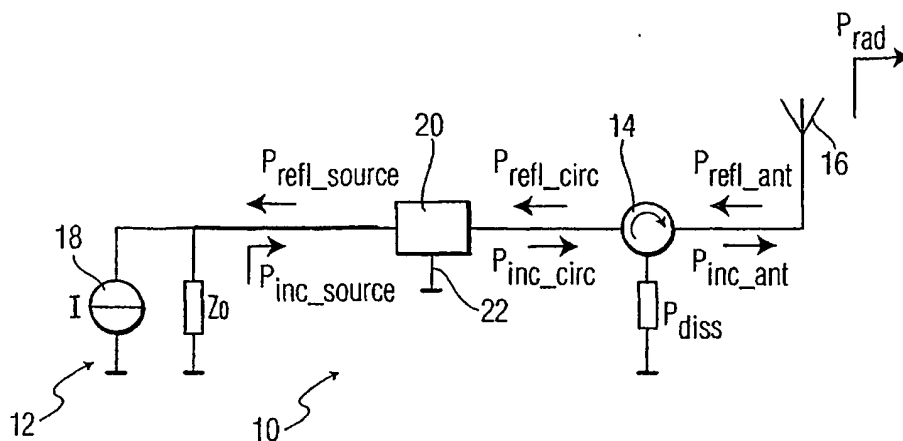


FIG. 1

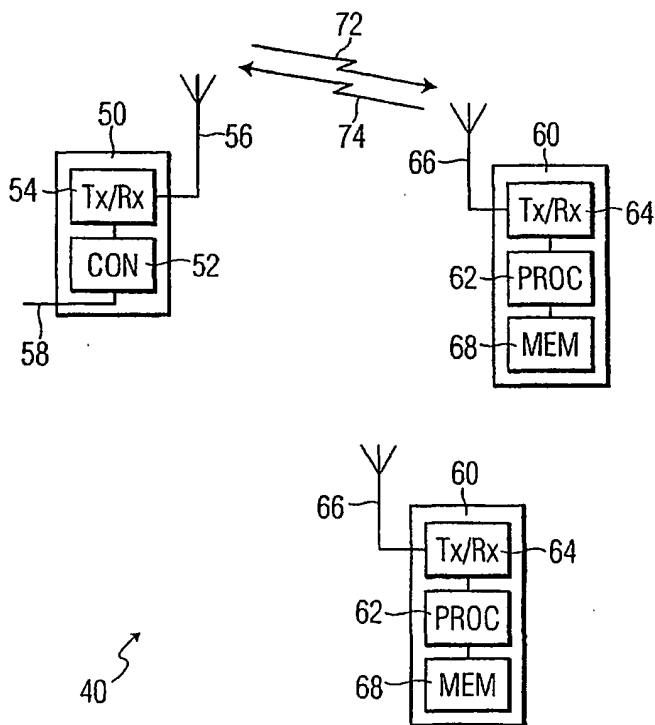


FIG. 2

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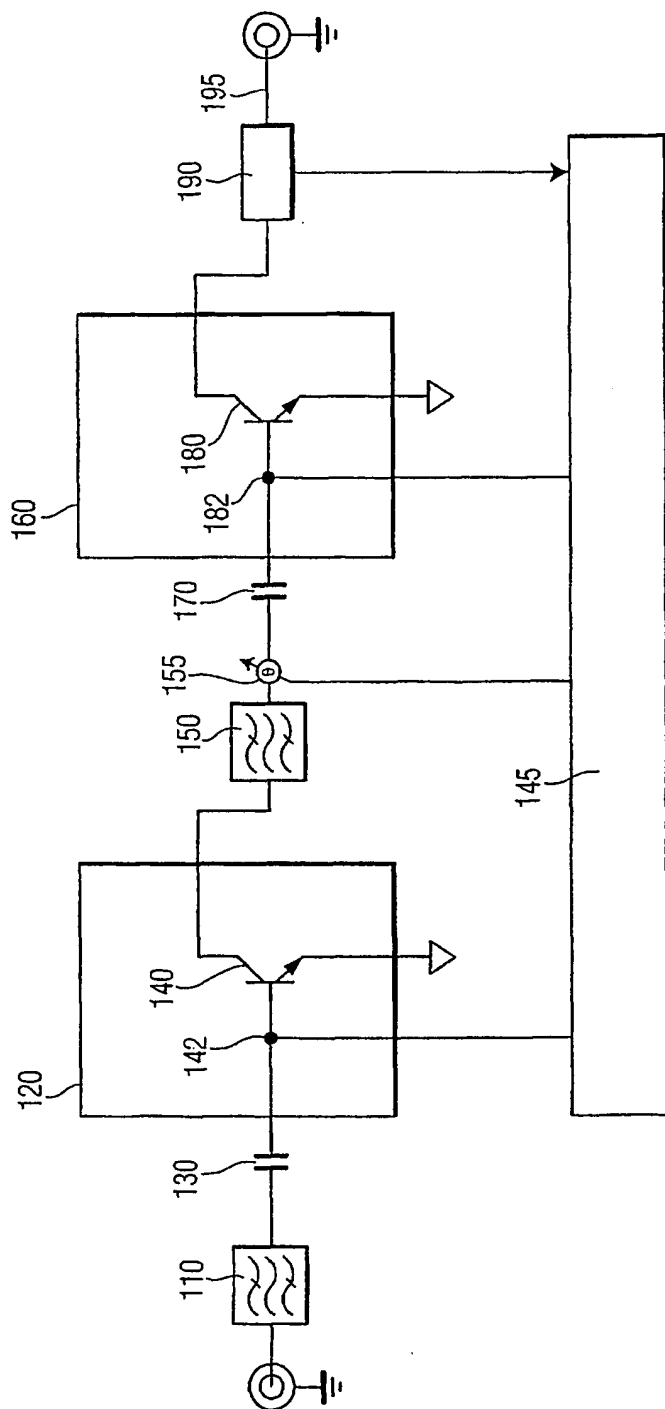


FIG. 3

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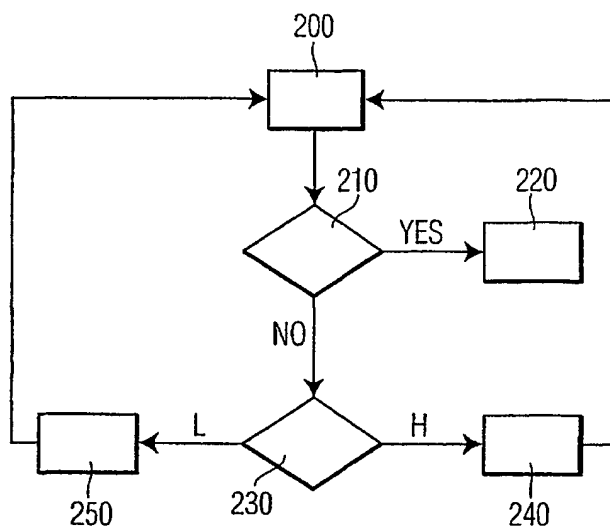


FIG. 4

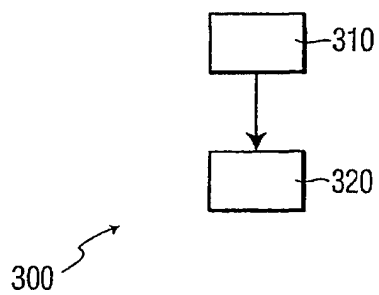


FIG. 5

INTERNATIONAL SEARCH REPORT

PCT/EP 03/05938

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H03F1/56 H03G3/20 H03F1/02

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H03F H03G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 4 547 746 A (ERICKSON ALAN R ET AL) 15 October 1985 (1985-10-15) abstract; figure 2 | 1,14,15 |
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☐

Further documents are listed in the continuation of box C.

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Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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|---|----|---------------------|------------------------------------|--------------------------|
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IN THE UNITED STATES PATENT AND TRADE MARK OFFICE

In re Application of

Atty. Docket

SALEH OSMAN ET AL

US020557

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Ex.

PRESERVING LINEARITY OF AN ISOLATOR-FREE POWER AMPLIFIER BY
DYNAMICALLY ADJUSTING GAIN AND PHASE

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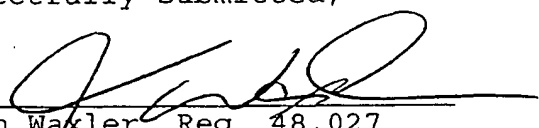
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Please charge any additional fees which may now or in the future be required in this application, including extension of time fees, but excluding the issue fee unless explicitly requested to do so, and credit any overpayment, to Deposit Account No. 14-1270.

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